

Attachment No. 5

Glycol Dehydration Unit

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

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Case Name: Hoblein Majors No. 1 dehy

File Name: C:\Kelley Share File\Merit\Air\2002 AIR\Hoblein Majors
1\HobleinMajors.1..ddf

Date: September 03, 2004

DESCRIPTION:

Description: PBR Site Review.

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	3.8267	91.842	16.7611
Ethane	0.3286	7.887	1.4394
Propane	0.1424	3.419	0.6239
Isobutane	0.0394	0.946	0.1727
n-Butane	0.0466	1.119	0.2042
Isopentane	0.0240	0.575	0.1050
n-Pentane	0.0180	0.433	0.0790
Cyclopentane	0.0400	0.961	0.1754
n-Hexane	0.0296	0.710	0.1296
Cyclohexane	0.0832	1.998	0.3646
Other Hexanes	0.0100	0.240	0.0438
Heptanes	0.0191	0.458	0.0835
Methylcyclohexane	0.1021	2.450	0.4471
Benzene	0.7043	16.902	3.0847
Toluene	0.9881	23.715	4.3281
Ethylbenzene	0.0551	1.324	0.2416
Xylenes	1.0407	24.976	4.5581
C8+ Heavies	1.2393	29.742	5.4279
Total Emissions	8.7373	209.696	38.2695
Total Hydrocarbon Emissions	8.7373	209.696	38.2695
Total VOC Emissions	4.5820	109.967	20.0690
Total HAP Emissions	2.8178	67.627	12.3419
Total BTEX Emissions	2.7882	66.917	12.2124

EQUIPMENT REPORTS:

ABSORBER

NOTE: Because the Calculated Absorber Stages was below the minimum allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25 and has calculated a revised Dry Gas Dew Point.

Calculated Absorber Stages: 1.25
 Calculated Dry Gas Dew Point: 3.57 lbs. H2O/MMSCF

Temperature: 105.0 deg. F
 Pressure: 1000.0 psig
 Dry Gas Flow Rate: 0.9650 MMSCF/day
 Glycol Losses with Dry Gas: 0.0206 lb/hr
 Wet Gas Water Content: Saturated
 Calculated Wet Gas Water Content: 68.41 lbs. H2O/MMSCF
 Calculated Lean Glycol Recirc. Ratio: 5.75 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	5.21%	94.79%
Carbon Dioxide	99.64%	0.36%
Nitrogen	99.96%	0.04%
Methane	99.97%	0.03%
Ethane	99.91%	0.09%
Propane	99.86%	0.14%
Isobutane	99.82%	0.18%
n-Butane	99.76%	0.24%
Isopentane	99.77%	0.23%
n-Pentane	99.71%	0.29%
Cyclopentane	98.73%	1.27%
n-Hexane	99.55%	0.45%
Cyclohexane	98.00%	2.00%
Other Hexanes	99.65%	0.35%
Heptanes	99.23%	0.77%
Methylcyclohexane	97.95%	2.05%
Benzene	85.05%	14.95%
Toluene	79.59%	20.41%
Ethylbenzene	75.74%	24.26%
Xylenes	68.36%	31.64%
C8+ Heavies	97.48%	2.52%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	44.63%	55.37%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.25%	99.75%
n-Pentane	0.28%	99.72%
Cyclopentane	0.43%	99.57%
n-Hexane	0.33%	99.67%
Cyclohexane	2.89%	97.11%
Other Hexanes	0.61%	99.39%
Heptanes	0.39%	99.61%
Methylcyclohexane	3.62%	96.38%
Benzene	4.93%	95.07%
Toluene	7.82%	92.18%
Ethylbenzene	10.31%	89.69%
Xylenes	12.82%	87.18%
C8+ Heavies	11.13%	88.87%

STREAM REPORTS:

WET GAS STREAM

Temperature: 105.00 deg. F
 Pressure: 1014.70 psia
 Flow Rate: 4.03e+004 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.44e-001	2.76e+000
Carbon Dioxide	7.15e+000	3.34e+002
Nitrogen	2.80e-002	8.32e-001
Methane	8.76e+001	1.49e+003
Ethane	3.24e+000	1.04e+002

Propane	8.37e-001	3.92e+001
Isobutane	1.57e-001	9.68e+000
n-Butane	1.64e-001	1.01e+001
Isopentane	6.89e-002	5.28e+000
n-Pentane	4.59e-002	3.52e+000
Cyclopentane	3.59e-002	2.68e+000
n-Hexane	4.79e-002	4.39e+000
Cyclohexane	4.19e-002	3.75e+000
Other Hexanes	1.90e-002	1.74e+000
Heptanes	1.80e-002	1.91e+000
Methylcyclohexane	4.29e-002	4.48e+000
Benzene	5.59e-002	4.64e+000
Toluene	4.89e-002	4.79e+000
Ethylbenzene	2.00e-003	2.25e-001
Xylenes	2.90e-002	3.27e+000
C8+ Heavies	2.50e-001	4.52e+001

Total Components	100.00	2.08e+003

DRY GAS STREAM

Temperature: 105.00 deg. F
Pressure: 1014.70 psia
Flow Rate: 4.02e+004 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	7.52e-003	1.44e-001
Carbon Dioxide	7.14e+000	3.33e+002
Nitrogen	2.80e-002	8.32e-001
Methane	8.77e+001	1.49e+003
Ethane	3.25e+000	1.04e+002
Propane	8.38e-001	3.91e+001
Isobutane	1.57e-001	9.66e+000
n-Butane	1.64e-001	1.01e+001
Isopentane	6.89e-002	5.27e+000
n-Pentane	4.59e-002	3.51e+000
Cyclopentane	3.56e-002	2.64e+000
n-Hexane	4.78e-002	4.37e+000
Cyclohexane	4.12e-002	3.67e+000
Other Hexanes	1.90e-002	1.73e+000
Heptanes	1.79e-002	1.90e+000
Methylcyclohexane	4.22e-002	4.39e+000
Benzene	4.77e-002	3.95e+000
Toluene	3.90e-002	3.81e+000
Ethylbenzene	1.52e-003	1.71e-001
Xylenes	1.98e-002	2.23e+000

C8+ Heavies	2.44e-001	4.40e+001

Total Components	100.00	2.07e+003

LEAN GLYCOL STREAM

Temperature: 105.00 deg. F
Flow Rate: 2.50e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)

TEG	9.82e+001	1.38e+002
Water	1.50e+000	2.11e+000
Carbon Dioxide	8.61e-011	1.21e-010
Nitrogen	2.14e-014	3.01e-014
Methane	1.13e-017	1.59e-017
Ethane	3.22e-008	4.52e-008
Propane	1.57e-009	2.21e-009
Isobutane	3.77e-010	5.30e-010
n-Butane	4.22e-010	5.93e-010
Isopentane	4.32e-005	6.08e-005
n-Pentane	3.62e-005	5.08e-005
Cyclopentane	1.22e-004	1.71e-004
n-Hexane	7.05e-005	9.91e-005
Cyclohexane	1.76e-003	2.47e-003
Other Hexanes	4.38e-005	6.15e-005
Heptanes	5.28e-005	7.42e-005
Methylcyclohexane	2.73e-003	3.83e-003
Benzene	2.60e-002	3.65e-002
Toluene	5.96e-002	8.38e-002
Ethylbenzene	4.51e-003	6.34e-003
Xylenes	1.09e-001	1.53e-001
C8+ Heavies	1.10e-001	1.55e-001

Total Components	100.00	1.41e+002

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 105.00 deg. F
Pressure: 1014.70 psia
Flow Rate: 2.79e-001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)

TEG	8.97e+001	1.38e+002
Water	3.07e+000	4.73e+000
Carbon Dioxide	1.27e+000	1.96e+000
Nitrogen	1.41e-003	2.17e-003
Methane	2.49e+000	3.83e+000
Ethane	2.14e-001	3.29e-001
Propane	9.25e-002	1.42e-001
Isobutane	2.56e-002	3.94e-002
n-Butane	3.03e-002	4.66e-002
Isopentane	1.56e-002	2.40e-002
n-Pentane	1.17e-002	1.81e-002
Cyclopentane	2.61e-002	4.02e-002
n-Hexane	1.93e-002	2.97e-002
Cyclohexane	5.57e-002	8.57e-002
Other Hexanes	6.53e-003	1.01e-002
Heptanes	1.24e-002	1.91e-002
Methylcyclohexane	6.88e-002	1.06e-001
Benzene	4.81e-001	7.41e-001
Toluene	6.96e-001	1.07e+000
Ethylbenzene	4.00e-002	6.15e-002
Xylenes	7.76e-001	1.19e+000
C8+ Heavies	9.06e-001	1.39e+000

Total Components	100.00	1.54e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
 Pressure: 14.70 psia
 Flow Rate: 1.84e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	3.00e+001	2.62e+000
Carbon Dioxide	9.18e+000	1.96e+000
Nitrogen	1.60e-002	2.17e-003
Methane	4.91e+001	3.83e+000
Ethane	2.25e+000	3.29e-001
Propane	6.65e-001	1.42e-001
Isobutane	1.40e-001	3.94e-002
n-Butane	1.65e-001	4.66e-002
Isopentane	6.84e-002	2.40e-002
n-Pentane	5.15e-002	1.80e-002
Cyclopentane	1.18e-001	4.00e-002
n-Hexane	7.07e-002	2.96e-002
Cyclohexane	2.04e-001	8.32e-002
Other Hexanes	2.39e-002	9.99e-003

Heptanes	3.92e-002	1.91e-002
Methylcyclohexane	2.14e-001	1.02e-001
Benzene	1.86e+000	7.04e-001
Toluene	2.21e+000	9.88e-001
Ethylbenzene	1.07e-001	5.51e-002
Xylenes	2.02e+000	1.04e+000
C8+ Heavies	1.50e+000	1.24e+000

Total Components	100.00	1.33e+001